Chapter 8

8. FLORA AND FAUNA

What is man without the beasts? If all the beasts were gone, men would die from a great loneliness of the spirit. For whatever happens to the beasts soon happens to man.[7]

8-1 Flora

Vegetation types of interior Alaska form a mosaic and reflect fire history, slope and aspect, and presence or absence of permafrost (Viereck and Little, 1972). Fort Greely has five recognized cover types: ice and snow; alpine tundra; moist tundra; open, low growing spruce forests; and closed, spruce-hardwood forests. The white spruce-paper birch forest of interior Alaska is often called the boreal forest or taiga.

8-1a Vegetative Profile

The huge landscapes at Fort Greely encompass a wide array of physiographic settings. Patterns of vegetation are determined by a variety of natural influences, including climate, topography (slope, aspect, and elevation), glaciation, flooding, depth to water table, and most importantly, permafrost and fire. A typical vegetation profile from the north slope to the Tanana River flood plain includes: barren areas (rock, gravel, snow, and/or ice), alpine tundra, moist tundra, forests (black spruce, white spruce, deciduous, and mixed), tall shrubs, barren, and water (Anonymous, 1979; Bonito, 1980). This vegetation profile does not precisely match Viereck and Little's (1972) vegetation types, which were assessed on a statewide basis. Wetlands occur at various altitudes and sometimes only during early vegetation successional stages. Local conditions often

[7] Chief Seattle, 1954

result in combinations or the absence of a vegetation type when moving up or downslope. Each cover type is described below.

Barren Land: These include glaciers, snowfields, bare and exposed rock in mountains, and recently deposited gravel bars in rivers. All barren land on Fort Greely occurs either at high altitudes or adjacent to rivers and streams. A small portion of Trident Glacier occurs on Fort Greely.

Tundra (Alpine and Moist): Windy and cold tundra occurs above tree line, and supports only the hardiest vegetation in a short growing season. Vegetation in alpine and moist tundra is a low, dwarf, or procumbent growth form and is limited by severe weather. Vegetation in ecotones between alpine and moist tundra exhibit vegetation found in both types, including sparse and scattered grasses, dry land sedges, lichens, club mosses, and low mat-forming herbaceous and woody plants. Woody perennials rarely exceed three feet in height. This ecosystem is extremely sensitive to damage. In southern portions of Fort Greely, moist tundra grades into alpine tundra, and then into glaciers (barren land).

High Brush: The high brush type forms the transitional zone, or ecotone, between forests and barrenareas or tundra. At lower elevations, it occurs between forests and barren areas adjacent to waterways. High brush normally occurs as a narrow vegetative band along flood plains or just above tree line. The size of the transitional zone varies dramatically, and in places where there is a well-defined tree line, it may be quite small. The high brush area is important ecologically. It sustains small to medium-sized woody plants, (no larger than 20 feet in height), including alder, willows, cottonwood, birch, mountain ash, and prostrate white spruce. Along flood plains, high brush forms a thick, almost impenetrable barrier with little or no ground cover. In sub-alpine settings, stands may be thinner and more persistent. Ground vegetation consists of grasses, mosses, forbs, low shrubs, and lichens that often form thick layers. Wildlife from both alpine and forest communities use high brush, particularly moose for forage (Bonito, 1980).

Forest: The forests of Fort Greely range from pure stands of spruce or hardwoods to spruce/hardwood mixtures. Predominate hardwoods are birch, quaking aspen, and balsam poplar. Bottomland forest of white spruce/balsam poplar occurs on level flood plains, low river terraces, and south-facing slopes. Stands of black spruce occur where drainage is poor, such as flat valley bottoms, lakesides, and muskegs. Lowland forest of black spruce/hardwood is the most common type in interior Alaska. On colder northern aspects, black spruce stands may grow at altitudes of up to 2,500 feet.

Wetland: Wetlands occur in a variety of forms, but on Fort Greely most are shrub wetlands. Shrub wetlands, also known as bogs or low brush, are associated with slightly higher relief of marsh edges and poorly-drained basins and depressions with cold, waterlogged soils. The surface primarily consists of a thick layer of peat over a mottled gray silt or silt loam. If not exposed, the water table is found only a few inches beneath the surface, and during periods of heavy precipitation may form temporary lakes. Depth to ice-rich permafrost is often less than 30 inches. Ground cover is characterized by a dense accumulation of mosses, lichens, sedges, rushes, liverworts, mushrooms, and other fungi. Stunted black spruce occasionally occurs. Along the margins of bogs and in drier areas, grasses, small shrubs, and smaller trees, such as willow and dwarf Arctic birch, proliferate (Anonymous, 1979).

8-1b Role of Fire

"*Fire rejuvenates these ecosystems*."[8]

Interior Alaska's vegetative pattern is largely influenced by fire. On Fort Greely, fires are most frequent on northern portions of the West Training Area. Between 1956 and 1987, 60 known fires burned over 150,000 acres in the Fort Greely/Delta Junction area. Particularly large fires included a 43,500-acre fire east of Jarvis Creek in 1987; a 35,450-acre fire near Delta Creek in 1971; a 17,500-acre fire west of the East Fork of Little Delta River in 1971; and an 8,000-acre fire in the lower One-Hundred-Mile Creek area in 1956 (BLM and U.S. Army, 1994; Bonito, 1980).

Bonito (1980) bases the summary of post-fire succession that follows on a literature review. The first year after a fire, grasses, fireweed, horsetail, and

[8] *Alaska Interagency Fire Management Plan,* Tanana/Minchumino Planning Area, March 1982.

morel mushrooms are common. Grasses and sedges along streams recover quickly, and birch seeds germinate by the second year. In wet muskeg, a continuous cover of grasses usually can be found within 3-5 years after a fire. Willow, Labrador tea, and birch recover first, followed by black spruce, and perhaps 100-200 years later, spruce-dominated sites develop again into muskegs.

Lichens may take 50-150 years to recover after a burn. On dry sites, aspen and birch replace willow. The birch may remain for 150 years until it is replaced by white spruce. Repeated burning tends to favor birch/aspen communities.

8-1c Floristics Inventory

Floristics inventory activities set the foundation on which many decisions regarding land management are based. Inventories range in intensity, based on their goals and objectives. The following lists the goals for Fort Greely's floristics inventory:

- Identify flora at Fort Greely
- Establish baseline data for the ITAM program
- Identify threatened or endangered plants, or species of concern

During 1995-1996, CRREL conducted a floristic inventory for USARAK at Fort Wainwright (Tande et al., 1996). The inventory focused on vascular plants, so cryptogams (i.e. mosses and lichens) were not identified. This inventory was the basis for the less intensive inventory at Fort Greely.

During 1997, CRREL started a floristic inventory in conjunction with a wetland inventory at Fort Greely, and collected 139 taxa (including subspecies and varieties). In 1998, CRREL collected and identified 340 additional taxa. CEMML laminated one full set of collected plants for use by the Fort Greely ITAM program. A mounted set will be accessioned into the collection at the University of Alaska Museum, Fairbanks, and an incomplete mounted set will be kept by CRREL.

All established goals are being met by the 1997-1998 inventory. There are no plans for additional plant inventories within the next five years. Additions to the floristics inventory will occur as new plants are identified, usually through the LCTA monitoring program.

8-1d Threatened or Endangered, and Species of Concern Plants

Interior Alaska has no federally-listed threatened, endangered, or candidate plant species.

8-1e Forest Inventory

Mapping by the Joint Federal-State Land Use Commission indicated that about 20,800 acres of Fort Greely are covered by spruce-poplar forest. Only 27% of forests in the Tanana Valley have commercial timber potential. Many stands are unharvestable due to contamination by ordnance. Little commercial potential exists for the remainder because of the lack of a local mill and restriction on exporting timber from federal lands (Anonymous, 1979).

The Tanana Chiefs Conference, Inc. conducted an inventory of forest resources on military land withdrawals within interior Alaska for the BLM (Tanana Chiefs Conference, 1993). The inventory included the Main Post area, the northern periphery of the West Training Area, the entire East Training Area, and GRTS for a total of 391,851 acres (about 60% of Fort Greely). Large tracts of unforested upland areas in the West Training Area were excluded from the inventory. Cover types were classified according to their commercial forest potential. Other types were classified as non-forested land, rivers, and other waters.

The total area determined to have commercial forest potential on Fort Greely that was inventoried was 158,487 acres or about 40%, while 54% was classified as non-forested land, 3% as rivers, and 3% as other waters. The minimum mapping unit was 15 acres. Considering areas not within the project definition, the 158,487 acres represents about 24% of Fort Greely and GRTS.

Sawtimber was defined as conifers more than nine inches in diameter at breast height (dbh) and deciduous trees greater than 11 inches in dbh. Poletimber was defined as conifers of 5-9 inches in dbh and deciduous trees of 5-11 inches in dbh. Table 8-1e shows the results of the Tanana Chiefs Conference inventory.

Table 8-1e. Timber Resources on Fort Greely (Tanana Chiefs Conference, 1993).

Species		Acreage	Area %	Volume*	Volume%
Sawtimber	White Spruce	1,227	2.1	12.39 mil	5.0
	Mixed White Spruce/Hardwood	328	0.5	6.068 mil	2.5
	Total Sawtimber	1,555	2.6	18.458 million	7.5
Pole Timber	White Spruce	26,640	44.7	159.839 mil	64.9
	Hardwood	13,311	22.3	7.99 mil	3.2
	Balsam Poplar	177	0.3	.249 mil	0.1
	White Spruce/Hardwood	7,523	12.6	27.08 mil	11.0
	Mixed White Spruce/Black Spruce	962	1.6	2.983 mil	1.2
	White Spruce /Balsam	2,495	4.2	14.469 mil	5.9
	Mixed Black Spruce/White Spruce/Hardwood	6,994	11.7	15.387 mil	6.2
	Total Pole Timber	58,102	97.4	227.995 million	92.5

* Board Feet

Sawtimber is a relatively small component of the forest resources on Fort Greely, which significantly reduces its commercial value. In addition, 69% of white spruce pole timber is located in closed areas.

Estimated annual harvest levels were calculated using the area control method. The following assumptions were made when determining harvest levels.

- White spruce, birch, and aspen are crop species; balsam poplar, black spruce, and tamarack are likely to remain non-merchantable in the near future
- Regeneration of softwoods and hardwoods can be variable, but it is estimated that 10 years will be required for trees to become established and reach "free to grow" status
- The estimated annual allowable harvest is based on present average net volumes
- White spruce sawtimber rotation length is 120 years, and hardwood sawtimber and fuelwood rotation length is 80 years

Based on inventory data and the assumptions above, 132 acres of white spruce sawtimber could be harvested per year from Fort Greely; yielding 177,000 cubic feet or 529,000 board feet. The estimated hardwood harvest was 219 acres/year, yielding 159,000 cubic feet or 475,410 board feet.

Potential harvest may not be actual harvest. Ecosystem management of forests on Fort Greely dictates that considerations other than purely commercial, such as wildlife values, are investigated prior to cutting timber.

Currently, there is no commercial forest harvest (with the exception of one small firewood sale) at Fort Greely pending the development of a Forest Management Plan as required by T*he Fort Greely Resource Management Plan* (BLM and U.S. Army, 1994). A Forest Management Plan will be developed for Fort Greely.

8-1e(1) Forest Stand Types - Characteristics and Potential Use

A 1993 draft forest management plan for Fort Wainwright (unpublished) described important forest stand types and discussed their potential use. Much of this description is applicable to Fort Greely. The stand type descriptions were obtained from the 1993 Fort Wainwright plan and have been modified for this INRMP.

8-1e(1)(a) White Spruce Type

White spruce is the climax species for much of interior Alaska, including Fort Greely. It usually occurs on well-drained upland sites, and is rarely found on waterlogged sites or extremely dry, sunny slopes. On north and east-facing slopes, white spruce is confined to drainage ways and the tops of slopes. The presence of either aspen or poplar in a spruce stand is often an indicator that the stand was logged at one time. Although pure stands do occur, white spruce is usually found in association with deciduous species. Over time, white spruce dominates these sites. Whether or not white spruce forms a climax stand in the absence of fire is unclear.

Early successional-stage forests and mixed stands are essential moose habitat. Many neotropical mi-

gratory birds also require early successional stages for nesting and foraging. Some species nest in "shrubby" thickets and require a hardwood component. Other species require dense stands of young conifers. Silvicultural practices for obtaining and maintaining mixed stands are ideal for most wildlife species. Potentially, anything done to favor white spruce stands/sites will also favor hardwood establishment.

On good sites, the dbh of white spruce can average 16 to 18 inches in less than 150 years, although the dbh of some trees exceeds 24 inches at 125 years. Mature stands usually do not exceed 85 to 100 feet in height. On upland sites, mature white spruce commonly range from 14 to 18 inches dbh, with the best sites producing trees with 15 to 16 inches dbh within 50 years. White spruce is highly valued for construction and for firewood.

8-1e(1)(b) Paper Birch Type

Paper birches are found primarily on upland sites. Trees are about 70 feet at 50 years of age with heights seldom exceeding 80 feet. Most stands are even-aged, except when they are over matured. The dbh of over mature paper birch commonly range from 12 to 16 inches, with some decadent stands having a dbh of over 18 inches. Heart rot weakens many trees.

Birch, after harvest, can regenerate naturally, but not as readily as aspen. Stem density and distribution of the harvested stands limit tree regeneration. Seeding is often necessary to produce adequately stocked stands. Birch trees produce large quantities of seed that can disperse over long distances; thus clearcutting is one option. A key aspect of birch seed germination is seedbed condition. Mineral soils are best because seeds may remain viable for up to a decade. Birch occurs on all exposures except north-facing slopes and can tolerate sites underlain by discontinuous permafrost. Birch wood is considered by many to be the best firewood in Alaska due to its high BTU content and clean-burning characteristics. It also has potential to be used for veneer or pulp. In its sapling stage, birch has browse value to wildlife.

8-1e(1)(c) Quaking Aspen Type

Aspen is predominantly limited to uplands on relatively dry, south or southwest-facing exposures. Dense stands mature after approximately 60 years and begin to open up. Heights in mature, pure stands seldom exceed 60 feet. Average dbh of aspens is 10 to 11 inches. In sites that support older trees, a dbh of 18 inches may be obtained. The most vigorous stands occur on warm, dry slopes; conditions unsuitable for other tree species. It is almost completely absent from cold, wet, north-facing slopes and lowlands where black spruce dominates.

Following harvest or fire, aspen produces abundant root suckers that grow rapidly and form dense patches. Aspen can dominate a site within a few weeks after a fire. It is managed through clearcutting and vegetative reproduction.

While aspen has limited value as fuelwood, it is an important habitat and food source at various successional stages, particularly for moose and ruffed grouse. Commercial values of aspen could increase if a pulpwood industry develops in interior Alaska.

8-1e(1)(d) Balsam Poplar Type

Balsam poplar stands are found along alluvial river deposits. On the best sites, poplars can be more than 20 inches dbh at 30 years and may eventually increase to 48 inches. This species is well adapted to river bars, stream bends, and lakeshores, where they may form nearly closed stands. As the height of river terraces increases, flooding becomes less frequent, therefore allowing white spruce to become established and increase in size and density. Eventually, white spruce becomes codominant, and balsam poplars show signs of decline. Aspen is a rare associate, and sometimes birch is a minor one. Occasionally, balsam poplar regenerates on upland burns and usually is replaced by white spruce over time.

The timber value of balsam poplar is not high. Utilization is limited to low-grade saw lumber and firewood.

8-1e(1)(e) Black Spruce Type

Stands of black spruce cover large areas of Fort Greely. Usually, they are found on poorly-drained sites, where permafrost is near the soil surface. Sites are cold, wet, and poorly aerated, often due to deep continuous mats of moss that insulate the permafrost and prevent summer thaw. Black spruce stands occur in relatively flat valley bottoms or on flat to gently rolling land on northern exposures. Permafrost often limits other vegetation. Higher, dry hum-

mocks may support islands of hardwoods, and lower wet sites can support tamarack or willow. On better sites, stand densities are high; trees are of even height, and rarely exceed 11 inches in dbh. Pure stands of short, narrow-crowned black spruce are common around lake and bog margins.

Black spruce stands will yield to tree crushing equipment or hydro-ax cutting to allow for reproduction and growth of willows, aspen, and other browse species. Prescribed burning will set stands back to the shrub/herb stages of succession. Commercial uses of black spruce are similar to those of white spruce if tree size and stand volume permit.

8-1e(1)(f) Brush Type

Brush fields occur at high mountain elevations, in small stream-valley bottoms, and as "pioneer" vegetation on disturbed sites. Brush fields include alder, willow, and dwarf birch. There is little evidence that commercially viable forest stands have or will occupy higher elevation sites. The presence of scattered spruce at these sites, either in the brush fields or along their borders, is evidence that the land will not support commercially viable forest growth. Willow and alder along flood plains or in disturbed sites often form dense thickets for 10 to 20 years. Alder is often associated with disturbed sites, such as gravel pits, road shoulders, rights-of-way, and military trails.

Alder provides important cover for a variety of wildlife and plays a significant role in fixing nitrogen. Early successional stages of willow are important moose habitat and can be very productive. Annual biomass production of 43 to 86 cubic feet per acre in 5 to 20 year-old alder/willow stands on flood plains has been reported.

8-1e(2) Summary of Commercial Inventory

On Fort Greely, sawtimber stands cover 1,555 acres, and have a total volume of 4,900,000 cubic feet of lumber. White spruce accounts for 79% of the sawtimber (by acreage); mixed white spruce/hardwood is the remaining 21%. Poletimber stands comprise 58,102 acres, and have a total volume of 100,300,000 cubic feet of lumber. White spruce poletimber is found on 26,640 acres with a total volume of 58,600,000 cubic feet; about 69% of white spruce poletimber occur within restricted areas. Hardwood poletimber is about 16% of the total volume, followed by white spruce/hardwood at 12%, mixed black spruce/white spruce/hardwood at 8.4%, and white spruce/balsam poplar at 3.7% (Tanana Chiefs Conference, 1993).

Approximately 132 acres of white spruce sawtimber could be harvested annually, yielding 223,080 cubic feet or 642,708 board feet of lumber. Hardwood harvest could occur on 219 acres/year, yielding 160,965 cubic feet or 65,919 board feet of lumber (Tanana Chiefs Conference, 1993).

The West Training Area contains about 70% of the timber resources. Wind-driven silt in trees is a problem along major rivers. The main use of silt-contaminated wood is pulp, because trees are crushed, not cut. A portion of the GRTS may be unsuitable for timber harvest due to unexploded ordnance.

8-1f Wetland

Wetland on Fort Greely includes freshwater marshes and shrub wetlands. Wetland may or may not qualify as jurisdictional wetlands as defined in Section 404 of the Clean Water Act. The Corps of Engineers determines jurisdictional wetlands on the basis of hydric soils, vegetation, and hydrology.

National Wetlands Inventory (NWI) mapping was completed in 1985 for 55% of Fort Greely (Figure 8-1f). NWI results have been digitized for GIS use. NWI overlooked many smaller wetlands, making this survey inadequate for installation natural resources management programs.

8-2 Fauna

Due to Fort Greely's variety of ecosystems and its relatively unobtrusive military activities, most species indigenous to central Alaska can be found on the installation. Relatively little is known about wildlife populations or their trends. Most research has been directed towards big game animals. A list of observed species on Fort Greely is provided in Appendix 8-3.

8-2a Game and Furbearer Species

Fort Greely is home to the largest variety of game mammals, furbearers, waterfowl, and upland game birds of any military area in the country (BLM and U.S. Army, 1994). Some big game species are:

Moose: Moose is the most visible and economically important wildlife species on Fort Greely. ADF&G's Game Management Unit 20A has one of the state's largest moose harvests, which covers the western portion of Fort Greely. The south-central and northeastern portion of the West Training Area and the far southern portion of the East Training Area are fall concentration areas for moose. Spring and summer concentrations are found in the northcentral portion of the West Training Area. Winter concentrations are found in the northeastern, southern, and far western portions of the West Training Area, and the northern portion of the East Training Area (Bonito, 1980). A 1984, late-fall survey for moose indicated that the population was 384 animals (±20%). The 1995 fall estimate was 700 to 1,100 moose on Fort Greely (Steve Dubois, personal communication). It is difficult to conduct meaningful moose surveys for Fort Greely alone because of the migratory habits of these animals. Figure 8-2a(1) shows known moose habitat on Fort Greely.

Bison: Bison were introduced into the Big Delta-Delta Junction area in 1928 after they were extirpated from the area 450-500 years ago. There are now four herds in Alaska; one at Fort Greely and the other three originating from this herd stock. In the 1950s, the Delta bison herd included more than 500 animals. By 1973, the herd was estimated to include 325 animals and by 1980 there were about 300 bison. The herd size was maintained through strict hunting regulations. In 1994, the number of bison in the herd was estimated at 446, with 70 bulls/100 cows and 53 calves/100 cows. During the 1994-95 season, 18 cows and 21 bulls were taken[9] . When winter food is plentiful, the cows have a high birth rate (70%), calf mortality is low (80% survival), and the herd's general health is good. Hunting is the main mortality factor. The Delta cows calve (April through July), primarily in the Delta River basin along terraces and gravel bars on or near the Texas and Washington ranges. Bison are generally off Fort Greely by late July-early August (Anonymous, 1979; Kiker and Fielder, 1980). Dubois (1992) summarized the history, natural history, economic status, and management plans for the Delta bison herd. Figure 8-2a(2) shows bison habitat on Fort Greely.

Dall Sheep: Dall sheep are found in the Molybdenum Ridge area in the southwestern portion of the West Training Area. Their population was estimated at less than 100 animals (Bonito, 1980). Spiers and Heimer (1990) studied this herd and found five subpopulations. They noted that their movements included areas both on and off Fort Greely. This study found 150 sheep on Fort Greely in winter and 100 in summer. Figure 8-2a(3) shows known ranges for Dall sheep on Fort Greely and surrounding areas.

Caribou: The Delta caribou herd is one of 13 distinct herds in Alaska. It ranges throughout moist tundra habitat along the Alaska Range. This relatively small herd spends spring and summer on calving grounds in the Trident Glacier foothills and then moves to the west of Fort Greely for the winter (Anonymous, 1995b). ADF&G identified the southeastern area of the West Training Area as winter habitat for caribou. In 1963, the herd was estimated at 5,000 head that ranged over 3,000 square miles. By 1974, the herd dropped to 1,400-2,000 animals (Anonymous, 1979). In 1979, the herd was estimated at about 4,000 animals with a high (63:100) calf/cow ratio (Spiers, 1982). The herd is currently estimated at 4,600 animals and growing. Caribou are hunted on Fort Greely, but few are harvested because usually the herd is off Army lands during the hunting season. Figure 8-2a(4) shows known ranges for caribou on Fort Greely.

Large predators include grizzly (Figure 8-2a(5)) and black bears, wolves, foxes, martens, coyotes, and wolverines. Many of these species, in addition to mink, muskrat, Arctic hare, and beaver, are trapped for fur on Fort Greely. There are no accurate harvest or population data for these species.

Several small game and related species are found on Fort Greely including willow and rock ptarmigan; spruce, sharp-tailed, and ruffed grouse; swans; ducks; geese; and cranes (figure 8-2c). Waterfowl nest on Fort Greely pothole lakes and are absent from the area during winter. There are no accurate harvest or population data for these species.

8-2b Nongame Mammals

A small mammal survey for Fort Greely has not been conducted. In 1979 a limited survey was completed

[9]ADF&G data, report dated December 1995.

by a high school student (Summers, 1980). His literature review indicated 14 species potentially occurred at Fort Greely, and he found six of them. A list of mammals (collected from Summers and others) known to occur on the installation is included in Appendix 8-3.

8-2c Nongame Birds

There have been no general bird surveys on Fort Greely. Some common nongame birds observed on the installation include the alder flycatcher, American kestrel, hawk owl, great-horned owl, yellow-rumped and orange-crowned warbler, common and hoary redpoll, dark-eyed junco, hairy woodpecker, red-tailed hawk, mew gull, gray jay, common raven, black-capped chickadee, American robin, varied thrush, hermit thrush, Swainson's thrush, gray-cheeked thrush, Bohemian waxwing, snow bunting, and cliff swallows (Anonymous, 1979). A survey for trumpeter swans in 1983 found only eight individual swans on the installation. No subsequent surveys for swans have been conducted. Sandhill crane habitat exists on Fort Greely (Figure 8-2c). Appendix 8-3 includes a list of bird species known to occur (through sightings) on Fort Greely.

8-2d Fish

Species common in the Tanana River include year-round residents (reproduce there) such as burbot, sheefish, humpback whitefish, and suckers; overwintering migrant species (reproduce elsewhere) such as grayling, round whitefish, and northern pike; and migratory species such as salmon and Arctic lamprey. The Delta River is important to the fall chum salmon and is also home to coho salmon, although it is more common in the Clearwater River. Major streams on Fort Greely are generally silt laden and do not support fisheries. A few clear streams flowing into these larger streams provide summer habitat for grayling, but none are important for spawning grayling (BLM and U.S. Army, 1994).

While some lakes and ponds on Fort Greely have naturally occurring populations of lake chub, northern pike, sculpin, and suckers, most are too shallow or oxygen deficient in the winter to support fish. Annual angler use varies between 500-1,000 on the 15 lakes ADF&G stocks with silver salmon, Arctic grayling, Arctic char, lake trout, and rainbow trout. Most of these lakes are readily accessible from the Richardson Highway. Koole Lake is west of the Delta River and is inaccessible by road (BLM and U.S. Army, 1994). A list of fish species in Fort Greely waters is provided in Appendix 8-3.

8-2e Reptiles and Amphibians

Wood frogs (*Rana sylvatica*) are the only amphibians on Fort Greely. There are no reptiles.

8-2f Threatened or Endangered, and Species of Special Concern Animals

The American peregrine falcon (*Falco pergrinus anatum*) was delisted in 1999. Though not known to nest on Fort Greely, it is an infrequent migrant; falcon eyries have been found along the Tanana and Salcha Rivers north of the installation. Peregrine falcons do not winter in Alaska.

The U.S. Forest Service lists the trumpeter swan (*Cygnus buccinator*) and osprey (*Pandion haliaetus carolinensis*) as sensitive species. The Forest Service lists species as sensitive when concerned about viability. Species are listed when populations and/or habitats have been reduced, restricted, or are vulnerable to resource development, or the species require special management to maintain viable populations (CEMML, 1998).

Trumpeter swans are known to nest on the West Training Area (Bruce, personal communication 1998). Trumpeter swans require wetlands with dense vegetation for nesting. In Alaska they create nests of horsetail and sedges, and feed on a variety of marsh and aquatic plants (CEMML, 1998).

Osprey nests are found in snags and living trees near waters with abundant fish populations. Osprey have been identified during the Breeding Bird Surveys on Fort Greely (CEMML, 1998).

Four passerines listed as species of special concern by the state of Alaska have been confirmed on the withdrawn lands. They are the olive-sided flycatcher (*Contopus borealis*), gray-cheeked thrush (*Catharus minimus*), Townsend's warbler (*Dendroica townsendii*), and blackpoll warbler (*Dendroica striata*). A species of concern listing was generated

to bring attention to the needs of vulnerable species before they require more extreme and costly management actions. Alaska Department of Fish and Game created the new category in 1993. At this time there are no legal requirements for managing the species, but attention should be given to protecting habitats (CEMML, 1998).

These migratory birds nest mainly in the coniferous forests of Alaska. The olive-sided flycatcher is also found in open woodlands, forest burns, boreal bogs, and muskegs. The gray-cheeked thrush nests in conifers and dense stands of alder or willow (CEMML, 1998).

The U.S. Fish and Wildlife Service, Office of Migratory Bird Management maintains a list of *Migratory Nongame Birds of Management Concern in the United States*. Species listed for Alaska that may occur on Fort Greely are Trumpeter swan, Common loon, Northern harrier, Northern goshawk, Olive-sided flycatcher, Alder flycatcher, Gray-cheeked thrush, and Blackpoll warbler.

Eighteen species confirmed on Fort Greely are included on the Boreal Partners in Flight Working Group as target or priority species for monitoring because of declines in populations noted across the Americas. There are no legal requirements to manage these species although all migratory bird species are afforded some protection under the Migratory Bird Treaty Act (Ruth Gronquist, BLM).